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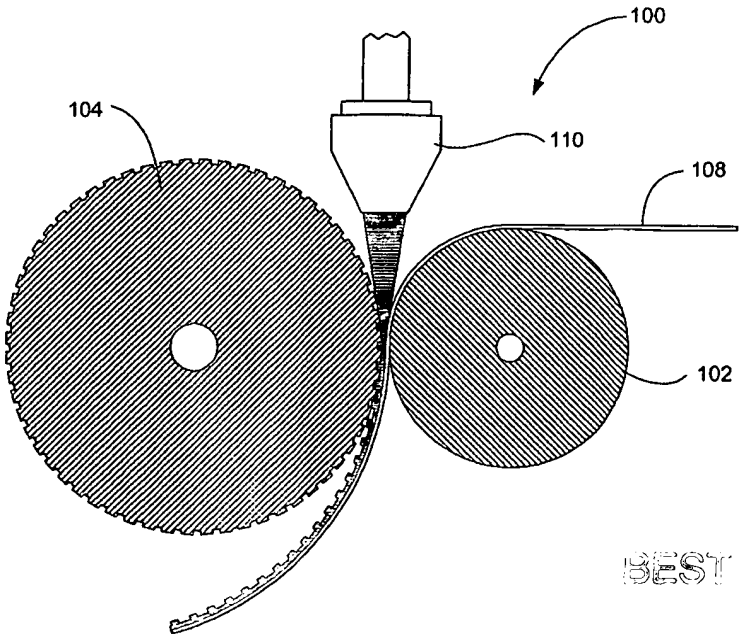
(54) Title: LIQUID-TRAPPING BAG AND METHOD OF MAKING IT



(57) Abstract: A bag for use in vacuum packaging comprises a first and second overlapping panels. A plurality of channels having a plurality of baffles is formed on one or more of the panels for evacuating air or other gases from inside the bag using suction, while preventing liquids from being drawn inside it. In one embodiment, the forming of a bag involves between cooling and laminating rolls includes feeding a gas-impermeable material to a nip between the rolls. Resin is extruded to the nip so that it fills a plurality of cavities of the cooling roll, forming an inner layer that adheres to the gas-impermeable material. The resultant sheet is folded to form the first and second panels and they are sealed to from an envelope.

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LIQUID-TRAPPING BAG AND METHOD OF MAKING IT.

CLAIM OF PRIORITY

[0001] This application claims priority from U.S. Provisional Patent Application No. 60/452,168, entitled "LIQUID-TRAPPING BAG FOR USE IN VACUUM PACKAGING," by Henry Wu, et al., filed March 5, 2003 (Attorney Docket No. TILA-01177US0); U.S. Provisional Patent Application No. 60/452,138, entitled "METHOD FOR MANUFACTURING LIQUID-TRAPPING BAG FOR USE IN VACUUM PACKAGING," by Henry Wu, et al., filed March 5, 2003 (Attorney Docket No. TILA-01177US1); U.S. Patent Application No. 10/___,___ entitled "LIQUID-TRAPPING BAG FOR USE IN VACUUM PACKAGING," by Hongyu Wu, et al., filed March 4, 2004 (Attorney Docket No. TILA-01177US2); and U.S. Patent Application No. 10/___,___ entitled "METHOD FOR MANUFACTURING LIQUID-TRAPPING BAG FOR USE IN VACUUM PACKAGING," by Hongyu Wu, et al., filed March 4, 2004 (Attorney Docket No. TILA-01177US3).

CROSS-REFERENCE TO RELATED PATENT APPLICATIONS

[0002] This application incorporates by reference all of the following co-pending applications:

[0003] U.S. Provisional Patent Application No. 60/452,172, entitled "SEALABLE BAG HAVING AN INTEGRATED TRAY FOR USE IN VACUUM PACKAGING," by Henry Wu, et al., filed March 5, 2003 (Attorney Docket No. TILA-01178US0);

[0004] U.S. Provisional Patent Application No. 60/452,171, entitled "METHOD FOR MANUFACTURING A SEALABLE BAG HAVING AN INTEGRATED TRAY FOR USE IN VACUUM PACKAGING," by Henry Wu, et al., filed March 5, 2003 (Attorney Docket No. TILA-01178US1);

[0005] U.S. Provisional Patent Application No. 60/451,954, entitled "SEALABLE BAG HAVING AN INDICIA FOR USE IN VACUUM PACKAGING," by Henry Wu, et al., filed March 5, 2003 (Attorney Docket No. TILA-01179US0);

[0006] U.S. Provisional Patent Application No. 60/451,948, entitled "METHOD FOR MANUFACTURING A SEALABLE BAG HAVING AN INDICIA FOR USE IN VACUUM PACKAGING," by Henry Wu, et al., filed March 5, 2003 (Attorney Docket No. TILA-01179US1);

[0007] U.S. Provisional Patent Application No. 60/452,142, entitled "SEALABLE BAG HAVING AN INTEGRATED ZIPPER FOR USE IN VACUUM PACKAGING," by Henry Wu, et al., filed March 5, 2003 (Attorney Docket No. TILA-01180US0);

[0008] U.S. Provisional Patent Application No. 60/452,021, entitled "METHOD FOR MANUFACTURING A SEALABLE BAG HAVING AN INTEGRATED ZIPPER FOR USE IN VACUUM PACKAGING," by Henry Wu, et al., filed March 5, 2003 (Attorney Docket No. TILA-01180US1);

[0009] U.S. Provisional Patent Application No. 60/451,955, entitled "SEALABLE BAG HAVING AN INTEGRATED VALVE STRUCTURE FOR USE IN VACUUM PACKAGING," by Henry Wu, et al., filed March 5, 2003 (Attorney Docket No. TILA-01181US0);

[0010] U.S. Provisional Patent Application No. 60/451,956, entitled "METHOD FOR MANUFACTURING A SEALABLE BAG HAVING AN INTEGRATED VALVE STRUCTURE FOR USE IN VACUUM PACKAGING," by Henry Wu, et al., filed March 5, 2003 (Attorney Docket No. TILA-01181US1);

[0011] U.S. Provisional Patent Application No. 60/452,157, entitled "SEALABLE BAG HAVING AN INTEGRATED TIMER/SENSOR FOR USE IN VACUUM PACKAGING," by Henry Wu, et al., filed March 5, 2003 (Attorney Docket No. TILA-01182US0);

[0012] U.S. Provisional Patent Application No. 60/452,139, entitled "METHOD FOR MANUFACTURING A SEALABLE BAG HAVING AN INTEGRATED TIMER/SENSOR FOR USE IN VACUUM PACKAGING," by Henry Wu, et al., filed March 5, 2003 (Attorney Docket No. TILA-01182US1);

[0013] U.S. Patent Application No. 10/169,485, entitled "METHOD FOR PREPARING AIR CHANNEL EQUIPPED FILM FOR USE IN VACUUM PACKAGE," filed June 26, 2002;

[0014] U.S. Patent Application No. 10/___,___, entitled "SEALABLE BAG HAVING AN INTEGRATED TRAY FOR USE IN VACUUM PACKAGING," by Hongyu Wu, et al., filed March 4, 2004 (Attorney Docket No. TILA-01178US2);

[0015] U.S. Patent Application No. 10/___,___, entitled "METHOD FOR MANUFACTURING A SEALABLE BAG HAVING AN INTEGRATED TRAY FOR USE IN VACUUM PACKAGING," by Hongyu Wu, et al., filed March 4, 2004 (Attorney Docket No. TILA-01178US3);

[0016] U.S. Patent Application No. 10/___,___, entitled "SEALABLE BAG HAVING AN INDICIA FOR USE IN VACUUM PACKAGING," by Hongyu Wu, et al., filed March 4, 2004 (Attorney Docket No. TILA-01179US2);

[0017] U.S. Patent Application No. 10/___,___, entitled "METHOD FOR MANUFACTURING A SEALABLE BAG HAVING AN INDICIA FOR USE IN VACUUM PACKAGING," by Hongyu Wu, et al., filed March 4, 2004 (Attorney Docket No. TILA-01179US3);

[0018] U.S. Patent Application No. 10/___,___, entitled,"SEALABLE BAG HAVING

AN INTEGRATED ZIPPER FOR USE IN VACUUM PACKAGING," by Hongyu Wu, et al., filed March 4, 2004 (Attorney Docket No. TILA-01180US2);

[0019] U.S. Patent Application No. 10/___,___, entitled, "METHOD FOR MANUFACTURING A SEALABLE BAG HAVING AN INTEGRATED ZIPPER FOR USE IN VACUUM PACKAGING," by Hongyu Wu, et al., filed March 4, 2004 (Attorney Docket No. TILA-01180US3);

[0020] U.S. Patent Application No. 10/___,___, entitled, "SEALABLE BAG HAVING AN INTEGRATED VALVE STRUCTURE FOR USE IN VACUUM PACKAGING," by Hongyu Wu, et al., filed March 4, 2004 (Attorney Docket No. TILA-01181US2);

[0021] U.S. Patent Application No. 10/___,___, entitled, "METHOD FOR MANUFACTURING A SEALABLE BAG HAVING AN INTEGRATED VALVE STRUCTURE FOR USE IN VACUUM PACKAGING," by Hongyu Wu, et al., filed March 4, 2004 (Attorney Docket No. TILA-01181US3);

[0022] U.S. Patent Application No. 10/___,___, entitled, "SEALABLE BAG HAVING AN INTEGRATED TIMER/SENSOR FOR USE IN VACUUM PACKAGING," by Hongyu Wu, et al., filed March 4, 2004 (Attorney Docket No. TILA-01182US2); and

[0023] U.S. Patent Application No. 10/___,___, entitled, "METHOD FOR MANUFACTURING A SEALABLE BAG HAVING AN INTEGRATED TIMER/SENSOR FOR USE IN VACUUM PACKAGING," by Hongyu Wu, et al., filed March 4, 2004 (Attorney Docket No. TILA-01182US3).

FIELD OF THE INVENTION

[0024] The present invention relates to bags for use in vacuum packaging and methods and devices for manufacturing bags for use in vacuum packaging.

BACKGROUND

[0025] Methods and devices for preserving perishable foods such as fish and meats, processed foods, prepared meals, and left-overs, and non-perishable items are widely known, and widely varied. Foods are perishable because organisms such as bacteria, fungus and mold grow over time after a food container is opened and the food is left exposed to the atmosphere. Most methods and devices preserve food by protecting food from organism-filled air. A common method and device includes placing food into a gas-impermeable plastic bag,

evacuating the air from the bag using suction from a vacuum pump or other suction source, and tightly sealing the bag.

[0026] A bag for use in vacuum packaging can consist of a first panel and second panel, each panel consisting of a single layer of heat-sealable, plastic-based film (for example, polyethylene). The panels are sealed together along a substantial portion of the periphery of the panels by heat-sealing techniques so as to form an envelope. Perishable products, such as spoilable food, or other products are packed into the envelope via the unsealed portion through which air is subsequently evacuated. After perishable products are packed into the bag and air is evacuated from the inside of the bag, the unsealed portion is heated and pressed such that the panels adhere to each other, sealing the bag.

[0027] U.S. Pat. No. 2,778,173, incorporated herein by reference, discloses a method for improving the evacuation of air from the bag by forming channels in at least one of the panels with the aid of embossing techniques. Air escapes from the bag along the channels during evacuation. The embossing forms a pattern of protuberances on at least one of the panels. The protuberances can be discrete pyramids, hemispheres, etc., and are formed by pressing a panel using heated female and male dies. The first panel is overlaid on the second panel such that the protuberances from one panel face the opposite panel. The contacting peripheral edges of the panels are sealed to each other to form an envelope having an inlet at an unsealed portion of the periphery. The perishable or other products are packed into the envelope through the inlet, and the inlet is sealed. Thereafter, an opening is pierced in a part of the panel material that communicates with the channels, air is removed from the interior of the envelope through the channels and opening, and the opening is sealed. This type of bag requires two additional sealing steps after the perishable or other product is packed into the envelope. One further problem is that embossing creates impressions on the plastic such that indentations are formed on the opposite side of the panel.

[0028] To avoid additional sealing steps, a vacuum bag is formed having a first

panel and a second panel consisting of laminated films. Each panel comprises a heat-sealable inner layer, a gas-impermeable outer layer, and optionally, one or more intermediate layers. Such a bag is described in U.S. Pat. No. Re. 34,929, incorporated herein by reference. At least one film from at least one panel is embossed using an embossing mold to form protuberances and channels defined by the space between protuberances, so that air is readily evacuated from the vacuum bag.

[0029] U.S. Pat. No. 5,554,423, incorporated herein by reference, discloses still another bag usable in vacuum packaging. The bag consists of a first and second panel, each panel consisting of a gas-impermeable outer layer and a heat-sealable inner layer. A plurality of heat-sealable strand elements are heat bonded at regular intervals to the inner layer of either the first panel or the second panel. The spaces between strand elements act as channels for the evacuation of air. The strand elements are extruded from an extrusion head and heat bonded to the heat-sealable layer by use of pressure rolls. Separate equipment is required for producing strand elements, and a procedure of heat bonding a plurality of strand elements at regular intervals to the heat-sealable inner layer is complicated. Also, various shapes of pattern are hard to form using this process.

BRIEF DESCRIPTION OF THE FIGURES

[0030] Further details of embodiments of the present invention are explained with the help of the attached drawings in which:

[0031] **FIG. 1A** is a perspective view of a method for manufacturing a vacuum bag in accordance with one embodiment of the present invention;

[0032] **FIG. 1B** is a side view of the method shown in **FIG. 1A** illustrating the embossing method used in an embodiment of the present invention;

[0033] **FIG. 1C** is a close-up view of a portion of **FIG. 1B**;

[0034] **FIG. 2A** is a top view of a partial portion of a first panel overlapping a partial portion of a second panel in accordance with one embodiment of the present invention;

[0035] **FIG. 2B** is a cross-section view through line 2B-2B of **FIG. 2A**;

[0036] **FIG. 3A-3E** are plan views of exemplary patterns on a panel in accordance with embodiments of the present invention, manufactured by the process shown in **FIG. 1**; and

[0037] **FIG. 4** is a perspective view of a vacuum bag in accordance with one embodiment of the present invention.

DETAILED DESCRIPTION

[0038] The detailed embodiments of the present invention are disclosed herein. It should be understood, however, that the disclosed embodiments are merely exemplary of the invention, which may be embodied in various forms. Therefore, the details disclosed herein are not to be interpreted as limiting, but merely as the basis for the claims and as a basis for teaching one skilled in the art how to make and/or use the invention.

[0039] **FIGs. 1A-1C** illustrate one embodiment of a method for manufacturing a vacuum bag in accordance with the present invention. The vacuum bag comprises a first panel and a second panel, wherein each panel comprises a gas-impermeable base layer **108**

and a heat-sealable inner layer 106 with at least one panel having liquid flow obstructing protuberances and/or channels. A laminating roll **102** and a cooling roll **104** are arranged so that melt-extruded resin can be introduced between the rolls and cooled to form the heat-sealable inner layer **106** and to laminate the formed inner layer **106** to the gas-impermeable base layer **108**. As illustrated in FIG. **1C**, a gap between the laminating roll **102** and the cooling roll **104** can be controlled according to specifications (for example, thickness) of a panel for use in vacuum packaging. The temperature of the cooling roll **104** is maintained in a range such that the melt-extruded resin can be sufficiently cooled to form a desired pattern. For example, a temperature range of about -15°C to about -10°C can be sufficient to properly form the desired pattern. The temperature range of the cooling roll **104** can vary according to the composition of the resin, the composition of the gas-impermeable base layer **108**, environmental conditions, etc. and can require calibration. Also, the cooling roll **104** can be sized to have a larger diameter than the laminating roll **102**, thereby bringing the melt-extruded resin into contact with more cooled surface area. For example, the diameter of the cooling roll **104** can be about one-and-a-half to about three times as large (or more) as that of the laminating roll **102**.

[0040] The heat-sealable inner layer **106** typically comprises a thermoplastic resin. For example, the resin can be comprised of polyethylene (PE) suitable for preserving foods and harmless to a human body. A vacuum bag can be manufactured by overlapping two panels such that the heat-sealable inner layers **106** of the two panels are brought into contact and heat is applied to a portion of the periphery of the panels to form an envelope. The thermoplastic resin can be chosen so that the two panels strongly bond to each other when sufficient heat is applied.

[0041] The gas-impermeable base layer **108** is fed to the gap between the cooling roll **104** and the laminating roll **102** by a feeding means (not shown). The gas-impermeable base layer can be comprised of polyester, polyamide, ethylene vinyl alcohol (EVOH), nylon,

or other material having similar properties, that is capable of being heated and capable of being used in this manufacturing process. The gas-impermeable base layer **108** can consist of one layer, or two or more layers. When employing a multilayer-structured base layer, it should be understood that a total thickness thereof is also adjusted within the allowable range for the total gas-impermeable base layer **108**.

[0042] An extruder 110 is positioned in such a way that the melt-extruded resin is layered on the gas-impermeable base layer **108** by feeding the melt-extruded resin to a nip between the cooling roll 104 and the gas-impermeable base layer **108**. The resin is fed through a nozzle **112** of the extruder **110**. The temperature of the melt-extruded resin is dependent on the type of resin used, and can typically range from about 200°C to about 250°C. The amount of resin extruded into the laminating unit **100** is dependent on the desired thickness of the heat-sealable inner layer **106**.

[0043] A pattern fabricated on the circumferential surface of the cooling roll **104** in accordance with one embodiment of the present invention can include cavities (and/or protuberances) defining a plurality of discrete channels having a baffled structure. The resin extruded from the nozzle 112 is pressed between the cooling roll **104** and the gas-impermeable base layer 108 and flows into the cavities of the cooling roll **104**. The resin quickly cools and solidifies in the desired pattern while adhering to the gas-impermeable base layer **108**, thereby forming the heat-sealable inner layer **106** of the panel. The heat-sealable inner layer **106** can be formed while the resin is sufficiently heated to allow the resin to flow, thereby molding the resin, unlike other methods adopting a post-embossing treatment where the heat-sealable inner layer is drawn by a die or embossed between male and female components.

[0044] The thickness of each protuberance formed on the heat-sealable inner layer **106** of a panel can be determined by the depth of the cavities of the cooling roll **104**, and the width of the channel can be determined by the interval between the cavities. Thus, the shape,

width, and thickness of the channels for the evacuation of air and/or other gases can be controlled by changing the spacings for the cavities of the cooling roll **104**. **FIGS. 2A** and **2B** illustrate a cross-section (taken along line 2B-2B) of two panels in accordance with one embodiment of the present invention (the thickness of the panels are exaggerated relative to the width of the channel walls and baffles). The heat-sealable inner layer **106** can range from preferably 0.5-6.0 mils in thickness at the channels **224**, and preferably 1.0-12.0 mils in thickness at the protuberances **220**,228, while the gas-impermeable base layer **108** can range from about preferably 0.5-4.0 mils in thickness. The dimensions of the inner layer and the base layer are set forth to illustrate, but are not to be construed to limit the dimensions of the inner layer and the base layer.

[0045] **FIG. 3A** is a plan view of a pattern **320** formed on a panel by the cooling roll **104** for use in a vacuum bag, in which the heat-sealable inner layer **106** is molded in such a way that protuberances form a plurality of channels **224** having channels walls **226** and baffles **228**. The baffles 228 can be arranged in a herringbone pattern at angles such that air and/or other gases **340** (shown schematically) can be drawn around the baffles **228** by suction and evacuated from the vacuum bag, while heavier liquid particles **342** can be trapped between the channel walls 226 and the baffles **228**. Angles formed by the intersection of baffles **228** and channel walls 226, and gaps between adjacent baffles **228** can be defined when producing the cooling roll 104 to suit the liquid intended to be trapped. Different arrangements of the baffles 228 relative to the chamber walls **226**, and relative to other baffles **228** can be multi-folded (e.g. to define liquid-trapping vessels), and can be optimized to improve evacuation of the air or other gases **340**, while effectively preventing liquids **342** from being drawn out of the vacuum bag. For example, as shown in **FIG. 3A** the baffles **228** can be arranged such that the approach angle for passing through the channel opening between the baffles **228** is small and that vessels formed by the baffles **228** are relatively deep, thereby retarding liquid by deflecting liquid **342** into the vessels and trapping a

significant amount of liquid 3[illegible]

[0046] As indicated [illegible], one of ordinary skill in the art can appreciate the multitude of different baffle arr[illegible]ients for retarding the evacuation of liquid **342** relative to the evacuation of air and/or [illegible]ases **340**. As shown in **FIG. 3B**, in other embodiments a pattern **320** fabricated on the [illegible]mferential surface of the cooling roll **104**, and thereafter the panel, can mold protuber[illegible]rming a plurality of channels **224** defined by "V"-shaped baffles **228**, eliminating the ne[illegible]molding channel walls. In still other embodiments, the channel walls **226** can extend [illegible]ntially the length of the panel with only a portion of the length of the channels near an [illegible]uation opening having baffles **228**.

[0047] As shown in [illegible], in other embodiments a pattern **320** fabricated on the circumferential surface of th[illegible]ing roll **104**, and thereafter the panel, can mold protuberances forming a plur[illegible]hannels **224** having channels walls **226** and baffles **228**, wherein each baffle **228** exten[illegible]ss a substantial portion of the width of the channel **224**, thereby defining a path betwe[illegible] baffle **228** and the channel wall **226** for the air and/or other gases **340** to be drawn[illegible]ffles **228** can alternatively be parabolic or rounded, as shown in **FIG. 3D**, to form p[illegible]r collecting liquid particles **342**.

[0048] **FIG. 3E** illustr[illegible]another embodiment of a pattern **320** fabricated on the circumferential surface of the[illegible]g roll **104**, and thereafter the panel, that can include parabolically-shaped or "U"-s[illegible]affles **228** arranged like fish-scales either along the length of the panel, or a pc[illegible]e panel to capture liquid particles **342**. The U-shaped baffles **228** can also include s[illegible]in the troughs of the U-shaped baffles **228** small enough to improve the flow of air an[illegible]gases **340** while retarding an amount of liquid particles **342**. In other embodiments, [illegible]s 228 can be more or less parabolic. One of ordinary skill in the art can appre[illegible]titude of different baffle shapes for retarding the evacuation of liquid rela[illegible]ation of air or other gases.

[0049] it is und[illegible]trapping of liquid in baffles or vessels formed in the

bag is advantageous as this s... retards and prevents liquids from being drawn into the vacuum pump or suction dev... vacuum sealing tool such as disclosed in U.S. Pat. No. 4,941,310, which is incorpor... in by reference.

[0050] **FIG. 4** illustr... g for use in vacuum packaging in accordance with one embodiment of the present in... . The vacuum bag **450** comprises a first panel **452** and a second panel **454** overlapp... other. Channels **224** are formed on at least one of the panels **452,454** in accordanc... an embodiment described above . The heat-sealable inner layer **106** and the gas i... eable base layer **108** of the first and second panels **452,454** are typically made o... he material respectively, but can alternatively be made of different materials that ex... t-sealability and gas-impermeability respectively. As described above, the resin-... layer **106** is used as an inner layer and the gas-impermeable base layer 108 is ... as an outer layer. The lower, left, and right edges of the first and the second panel ... re bonded to each other by heating, so as to form an envelope for receiving a pe... or other product to be vacuum packaged. Once a perishable or other product is ... in the vacuum bag **450**, air and/or other gases can be evacuated from the bag 450, ...pl by a vacuum sealing machine as described in the above referenced U.S. Pat. ... ,310, which is incorporated herein by reference. Once the air and/or other gase... uated to the satisfaction of the user, the inlet can be sealed by applying heat, the... ating the heat-sealable inner layers **106** and bonding them together where con... eat.

[0051] The foreg... of preferred embodiments of the present invention has been provided for t... illustration and description. It is not intended to be exhaustive or to limit the ... precise forms disclosed. It is to be understood that many modifications and ... apparent to the practitioner skilled in the art. The embodiments were cho... ed in order to best explain the principles of the invention and its practica... by enabling others skilled in the art to understand

the invention for various embodiments and with various modifications that are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the following claims and their equivalents.

CLAIMS

1. A bag adapted to rece article, comprising:

a first panel inc g a plurality of protuberances;

a second pan

the first panel e second panel secured together to form the bag.

2. A bag adapted to rec article, comprising:

a first panel

a firs ayer; and

a first ayer connected with the first outer layer, the first inner layer including a plurality of p ances; and

a second pan ected with the first panel such that the first panel and the second panel form an envel ng an inlet, the second panel having:

a se er layer; and

a se ner layer connected with the second outer layer;

wherein whe st inner layer contacts the second inner layer the plurality of protuberances obstruct liq through the inlet.

3. The bag of claim 2, v ne first outer layer and the second outer layer comprise a gas-impermeable materia.

4. The bag of claim 3, v n the gas-impermeable material is one of polyester, polyamide, ethylene vinyl a nd nylon.

5. The bag of claim 2, v ne first inner layer and the second inner layer comprise a thermoplastic resin.

6. The bag of claim 5, wh the thermoplastic resin is polyethylene.

7. The bag of claim 2, w in the plurality of protuberances define a plurality of channels.

8. The bag of claim 7, w the plurality of channels includes a plurality of baffles.

9. The bag of claim 8, w the plurality of baffles are arranged in a herringbone pattern.

10. The bag of claim 8, w in the plurality of baffles form a plurality of pockets for trapping liquid particles.

11. The bag of claim 2, w the plurality of protuberances define a plurality of baffles.

12. The bag of claim 11, w in the plurality of baffles form a plurality of pockets for trapping liquid particles.

13. The bag of claim 8, w the plurality of baffles comprise a U-shape.

14. The bag of claim 13, w in the plurality of baffles include a slit in a trough of the U-shape, the slit being sized s gas can pass through the slit.

15. A bag adapted to re article, comprising:

a first panel

a f meable layer; and

a first ... layer laminated to the first gas-impermeable layer, the first inner layer having a text ... posed surface; whe... textured exposed surface obstructs liquid flow when gas is evacuated through the heat... ble opening; and a second pa... ...ing: a se... ...permeable layer; and a se... ...er laminated to the second gas-impermeable layer; wherein the ... ...l is connected with the second panel to form an envelope such that the fir... ...opposes the second inner layer, the envelope including a heat-sealable o... ...cuating gas.

16. A heat-sealable bag ... d to receive an article, comprising:

a first pane... ...g:

a ... ...eable layer;

at le... ...first intermediate layer connected with the first gas-impermeable layer; and

a fi... ...er laminated to the at least one first intermediate layer, the first inner layer having a ... ...osed surface;

whe... ...textured exposed surface obstructs liquid flow when gas is evacuated through the he... ...ble opening; and

a second p... ...el:

a s... ...permeable layer;

at l... ...nd intermediate layer connected with the second gas-impermeable layer; a...

a ... layer laminated to the at least one second intermediate layer;

wherein ... ... connected with the second panel to form an

envelope such that the fi[illegible] a[illegible] opposes the second inner layer, the envelope including a heat-sealable c[illegible] r[illegible]cuating gas.

17. The bag of claim 1 [illegible] n [illegible] first gas-impermeable layer and the second gas-impermeable layer compri[illegible] c[illegible]er, polyamide, ethylene vinyl alcohol, and nylon.

18. The bag of claim 1[illegible] t[illegible]st inner layer and the second inner layer comprise a thermoplastic resin.

19. The bag of claim 1[illegible] [illegible] thermoplastic resin is polyethylene.

20. The bag of claim 1[illegible] [illegible] textured exposed surface comprises a plurality of channels.

21. The bag of claim [illegible] ein[illegible]e textured exposed surface further comprises a plurality of baffles.

22. The bag of claim 2[illegible] [illegible] plurality of baffles are arranged in a herringbone pattern.

23. The bag of claim 2[illegible] in [illegible] plurality of baffles form a plurality of pockets for trapping liquid particles.

24. The bag of claim 1[illegible] [illegible] textured exposed surface comprises a plurality of baffles.

25. The bag of claim 2[illegible] in t[illegible] plurality of baffles form a plurality of pockets for trapping liquid particles.

26. The bag of claim 2[illegible] [illegible] plurality of baffles comprise a U-shape.

27. The bag of claim 2 [illegible] plurality of baffles includes a slit in a trough of the U-shape, the slit being siz[illegible] can pass through the slit.

28. A bag adapted to r[illegible]le, comprising:

a first pan[illegible] rality of receptacles adapted to trap a liquid and a plurality of channels that p[illegible] ptacles, which channels are adapted to allow the passage of a gas;

a second p[illegible]

the first pa[illegible] cond panel secured together to form the bag.

29. A bag adapted to r[illegible]le, comprising:

a first pan[illegible] rality of receptacles adapted to trap a liquid, which receptacles are formed w[illegible] hat runs about along a length of the bag and a plurality of second walls th[illegible] ction that is across the length of the bag;

a second p[illegible]

the first pa[illegible] cond panel secured together to form the bag.

30. A system for formi[illegible] g a three-dimensional structure formed on at least one panel, comprising:

a cooling r[illegible] lity of cavities for forming one or more structures;

wherein th[illegible] tructures include a plurality of receptacles adapted to trap a liquid;

a laminatin

a backing r

a flowable r ...n be flowed into the one or more cavities to form the one or more structures, ...aterial adhering to the backing material.

31. A method for formi ...se in a sealable bag, comprising:

flowing a r ... backing film, such that the flowing material is molded to form a structure;

wherein the ...udes a plurality of protuberances;

cooling the ...al such that the flowing material solidifies to form an inner layer having the st

wherein the ...heres to the backing film.

32. A method for formi ...ted to receive an article, the bag being partially formed between a laminati... ...oling roll having a plurality of cavities for forming a structure, comprising:

feeding a g ...le film to a nip formed by the cooling roll and the

laminating ...

extruding r... ... the resin fills the nip and the plurality of cavities exposed to the nip;

pressing th ...n the cooling roll and the laminating roll;

cooling the ...t the resin forms the structure and adheres to the gas-impermeable film, forn

wherein the ...nprises a plurality of protuberances;

folding the ...at a first portion of the panel overlaps a second portion of the panel; and

applying h... ...ond, and third side of the first and second portions

such that an envelope is for

33. A method for manuf adapted to receive an article, comprising:

feeding a fir eable film to a first nip between a first cooling roll and a first laminating roll, t g roll having a plurality of cavities for forming a structure;

extruding m he first nip;

pressing th between the first cooling roll and the first gas-impermeable film such that : n fills the plurality of cavities exposed to the first nip;

cooling the r the resin forms the structure and adheres to the gas-impermeable film, form l;

wherein the prises a plurality of protuberances;

feeding a se ermeable film to a second nip between a second cooling roll and a second la

extruding m he second nip;

pressing th between the second cooling roll and the second gas-impermeable film;

cooling the : uch that a second inner layer is formed;

wherein the ayer adheres to the second gas-impermeable film, thereby forming a second p

overlapping l with the second panel; and

applying he ond, and third side of the first and second panels such that the first panel an nel form an envelope.

34. A method for manu adapted to receive an article, comprising:

rotating a f at a first rate, the first cooling roll including one or

both of a plurality of cavities · y of protuberances for forming a structure having

a plurality of channels define ially by a plurality of baffles;

rotating a fir oll at a second rate;

introducing a ermeable film having at least one layer to a first nip

between the first cooling roll aminating roll;

extruding m he first nip;

pressing th between the first cooling roll and the first gas-

impermeable film such that t in fills the plurality of cavities exposed to the first

nip;

cooling the uch that a first inner layer is formed;

wherein the r comprises the structure;

wherein the adheres to the first gas-impermeable film, thereby

forming a first panel;

rotating a s roll at a third rate;

rotating a s ng roll at a fourth rate;

introducing -impermeable film having at least one layer to a

second nip between the sec oll and the second laminating roll;

extruding n he second nip;

pressing th between the second cooling roll and the second

gas-impermeable film;

cooling the uch that a second inner layer is formed;

wherein the yer adheres to the second gas-impermeable film,

thereby forming a second ,

overlapping l with the second panel; and

applying h f a periphery the first and second panels such that

the first panel and the sec n envelope.

35. The method of claim :e second rate is an integer multiple of the first rate and the fourth rate is an inte : the third rate.

36. The method of claim :e first gas-impermeable film and the second gas-impermeable film comprise :yer.

37. The method of claim :e at least on layer is one of polyester, polyamide, ethylene vinyl alcohol, and i

38. The method of clain .he molten resin is polyethylene.

39. The method of clain : thickness of the first inner layer is determined by the size of the first nip and t : the second inner layer is determined by the size of the second nip.

40. The method of clai . the plurality of protuberances are a plurality of baffles.

41. The method of clai ı the plurality of protuberances are a plufality of vessels.

42. The method of clai ı the plurality of protuberances are a plurality of catches.

43. A method of manuf adapted to receive an article, comprising:

rotating a f ı a plurality of recesses that can define a plurality of receptacles;

rotating a se acent to the first roller, said second roller can feed

a first film adjacent to the fir

applying a n between the first roller and the film;

said molten the recesses of the first roller, and said molten

material and film moving be roller and the second roller forming a first panel

with a plurality of receptacle

forming a se nd

mating the f second panel in order to form a bag.

44. The method of cla

using a gas material for the film; and

using a hea erial for the molten material.

45. The method of clai rming the plurality of receptacles forms a plurality of baffles.

46. The method of clain rming the plurality of receptacles forms a plurality of vessels.

47. The method of clain rming the plurality of receptacles forms a plurality of catches.

48. The method of clain aid second panel is formed with the first roller and the second roller.

49. The method of clair aid second panel is formed with the first roller and the second roller, and the m des folding the first panel over the second panel.

50. The method of claim aid first roller includes a peripheral surface having a first portion including the pl sses for defining a plurality of receptacles and a second portion without a plu es.

51. The method of claim e first roller includes another plurality of recesses that can be filled with the mo o form channels that run the length of the film.

52. The method of claim orming the receptacles in part with walls that run parallel to the length of t... with walls that run across the length of the firm.

53. The method of claim ming the receptacle from the plurality of recesses with some of the plurality of ing the parallel to the length of the film and some of the plurality of recesses r... the length of the firm.

54. The method of cla g forming the receptacles from the plurality of recesses with some of the p... sses running in about the direction of rotation of a peripheral surface of the ... me of the recesses running in about a direction across the direction of rotatic heral surface.

55. The method of cl... rming the plurality of receptacles forms U shaped receptacles.

56. The method of clai rming the plurality of receptacles forms V shaped receptacles.

57. The method of clain rming the plurality of receptacles forms L shaped receptacles.

58. The method of claim rming the plurality of receptacles forms a plurality of liquid trapping shapes.

59. The method of cl a passage is formed the plurality of receptacles such that gas flows throu

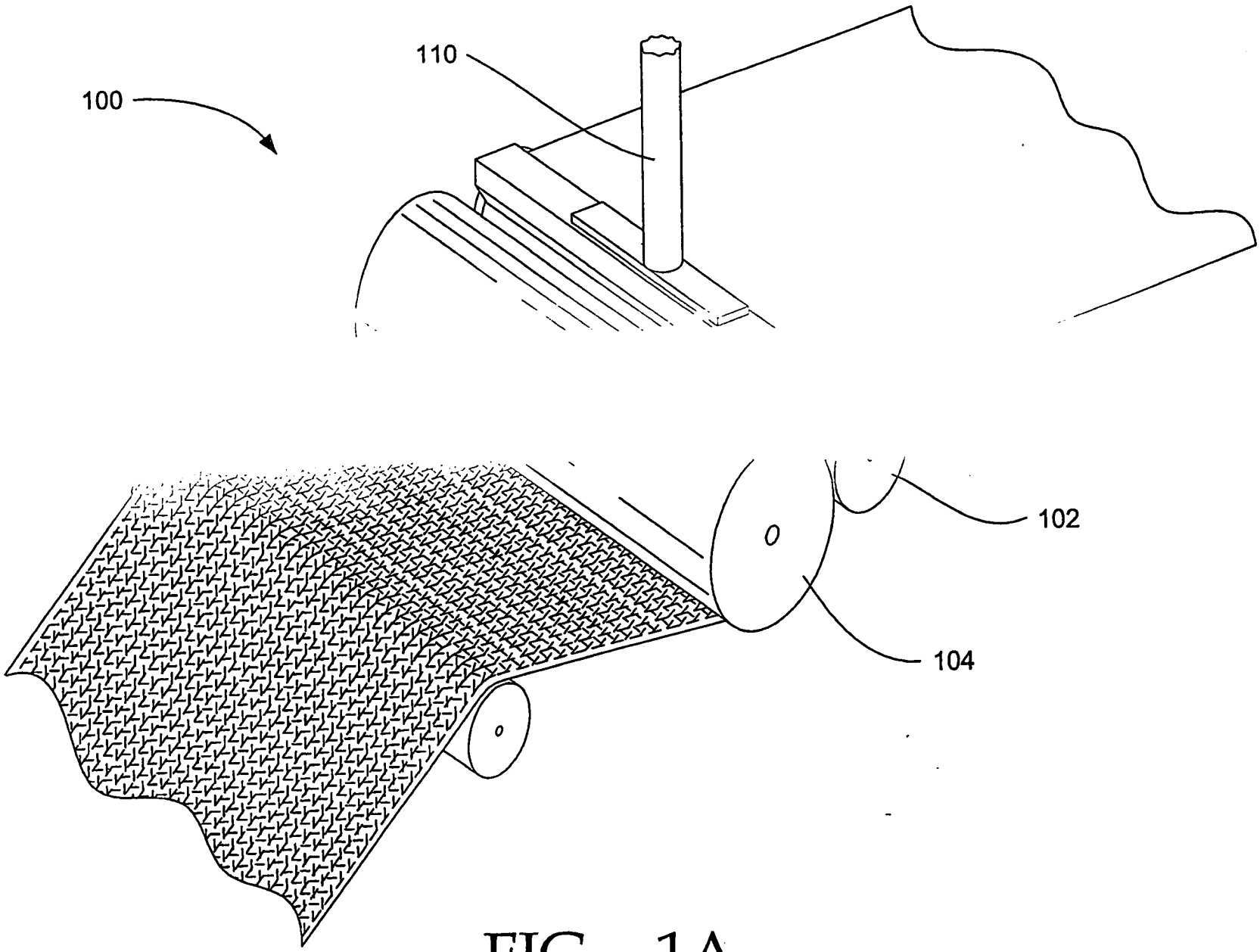
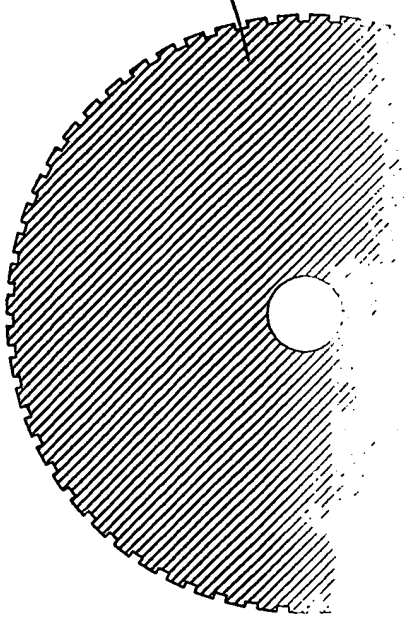
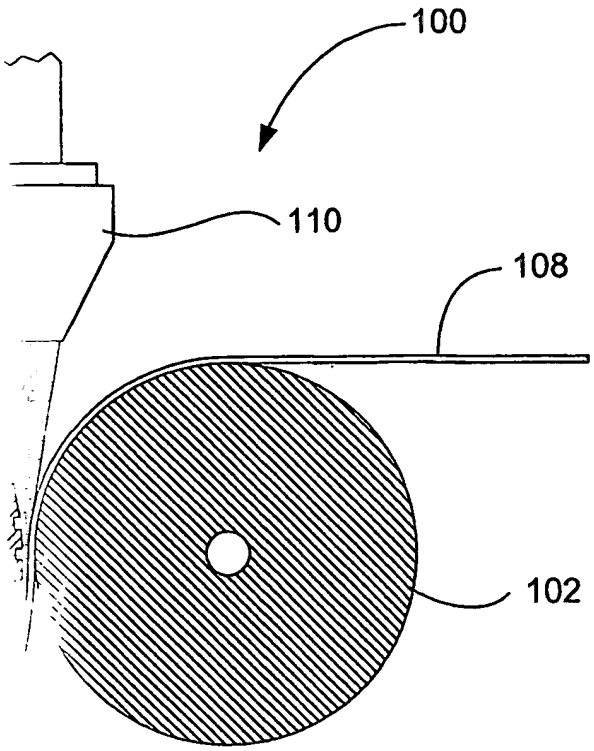
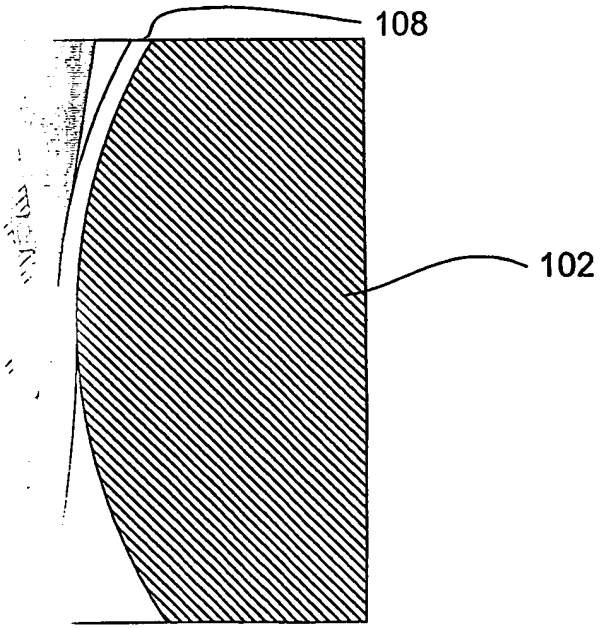


FIG. - 1A

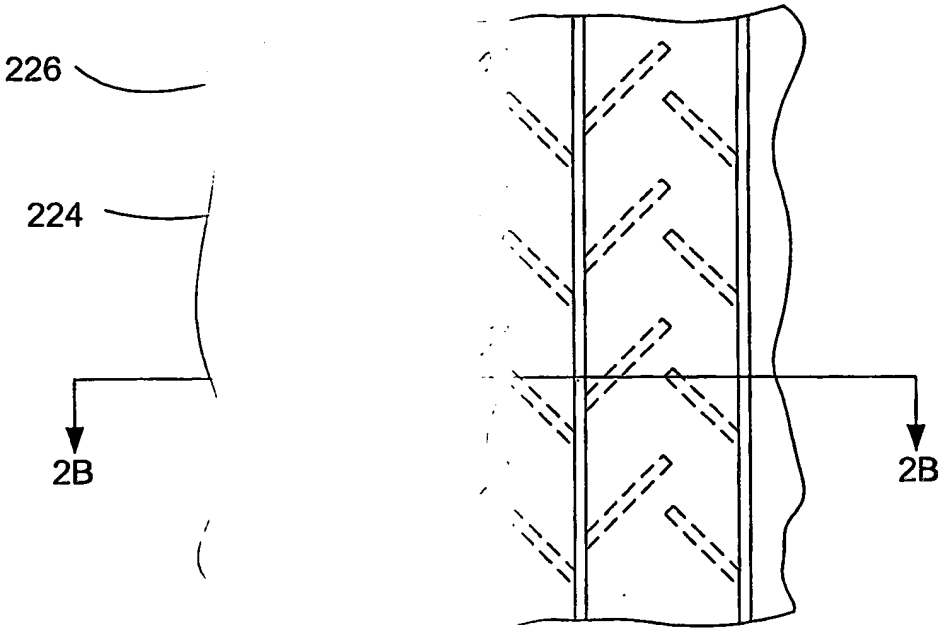




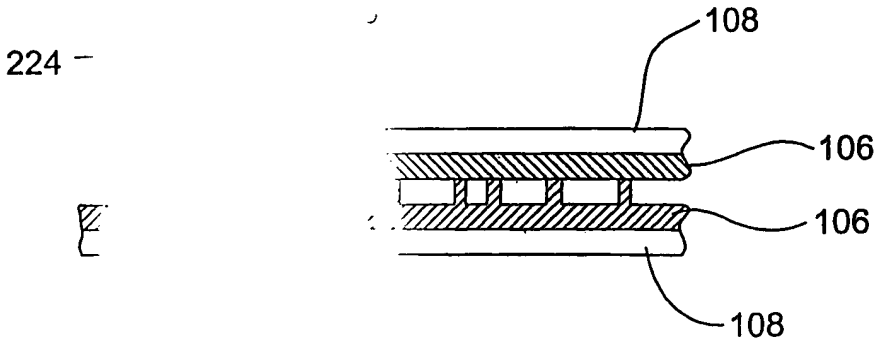
- 1B



- 1C



2A



2B

2:

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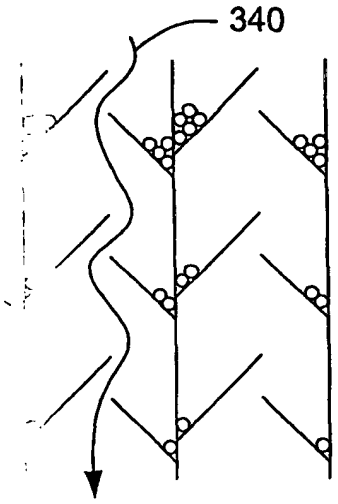
34:

22E



22·

. - 3A

2:

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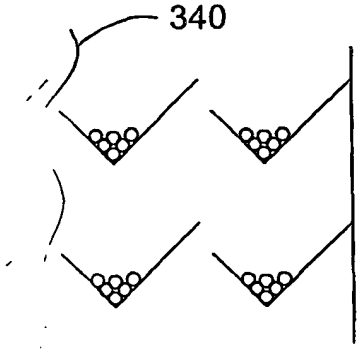

224

. - 3B

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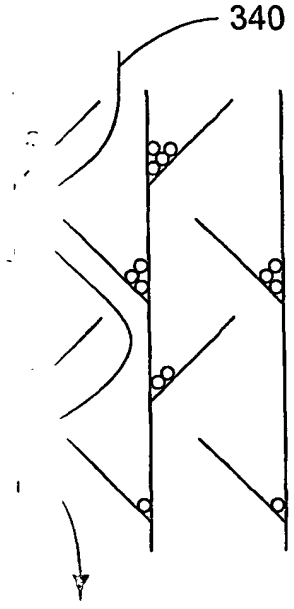

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- 3C

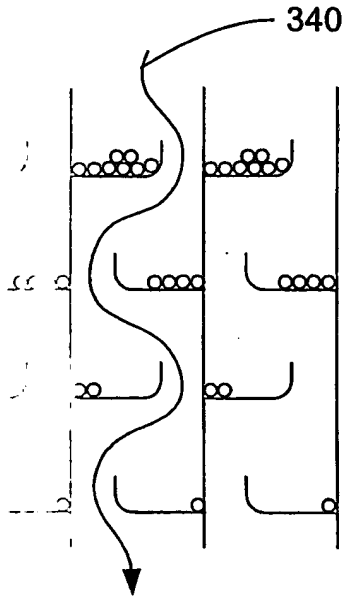

FIG. 3D

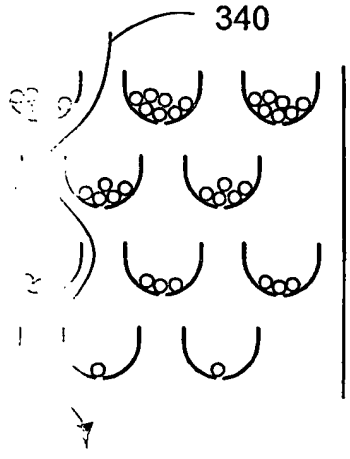

FIG. 3E

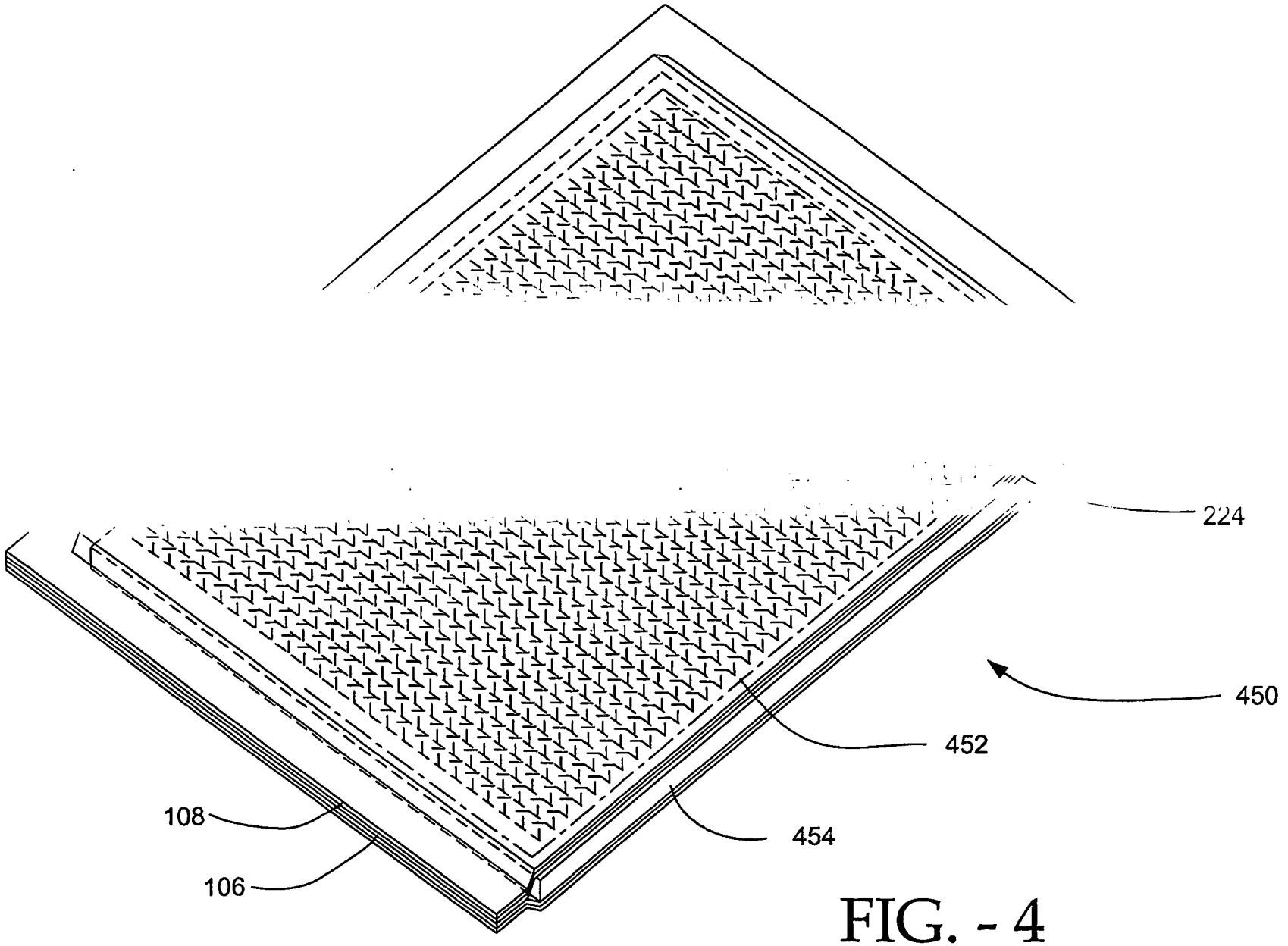

FIG. - 4

INTERNATIONAL

International application No.
PCT/US04/06769

A. CLASSIFICATION OF SUBJECT
IPC( ) : B65D 33/00
US CL : 428/35.7, 36.6, 36.7, 34
According to International Patent Classificat

B. FIELDS SEARCHED

Minimum documentation searched (classific
U.S. : 428/35.7, 36.6, 36.7, 346

Documentation searched other than minimun
NONE

Electronic data base consulted during the in
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED T

Category *	Citation of document, w	of the relevant passages	Relevant to claim No.
X	US 2,778,173A (TAUNTON	col. 1, lines 16-22, Figures 3-	1 and 28
---	9B, 15 and 18.		---
Y			1-13, 15-26, and 28-59
Y	US 5,554,423A (ABATE) 1(lines 36-44.	l. 1, lines 62-67 and col. 2,	1-13, 15-26 and 28-59
Y	JP 10034760A (No name	2.1998), title and abstract.	31-59

☐ Further documents are listed in the

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Date of the actual completion of the inter
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Continuation of B. FIELDS SEARC
WEST, USPAT, Derwent: projection, pr, vacuum, bag, sealable, gas-(im)permeable, vapor-(im)permeable.